# Appendix H

# General Conformity Analysis

Environmental Analysis Branch June 12, 2015
(CENAN-PL-E)

**RECORD OF NON-APPLICABILITY (RONA)**

Project Name: South Shore of Staten Island (SSSI) Feasibility Study
Reference: Equipment list and schedule provided 9/4/2014

Project/Action Point of Contact: Catherine Alcoba,

Begin Date: June 2016

End Date: October 2019

1. The project described above has been evaluated for Section 176 of the Clean Air Act. Project related emissions associated with the federal action were estimated to evaluate the applicability of General Conformity regulations (40CFR§93 Subpart B).

2. The requirements of this rule do not apply because the total direct and indirect emissions from this project are significantly less than the 100 tons trigger levels for $NO_x$, VOC, $PM_{2.5}$, or CO for each project year (40CFR§93.153(b)(1) & (2)). The estimated annual $NO_x$ emissions for the project are: 13.8 tons for 2016, 51 tons for 2017, 45.7 tons for 2018, and 20.2 tons 2019. VOC, $PM_{2.5,}$ and CO are significantly lower than the $NO_x$ emission estimates as $NO_x$ is the primary mass criteria pollutant from diesel equipment. Total annual emissions by pollutant provided in attachment.

3. The project is presumed to conform with the General Conformity requirements and is exempted from Subpart B under 40CFR§93.153(c)(1).

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Emissions have been estimated using project planning information developed by the New York District, consisting of anticipated equipment types and estimates of the horsepower and operating hours of the diesel engines powering the equipment. In addition to this planning information, conservative factors have been used to represent the average level of engine load of operating engines (load factors) and the average emissions of typical engines used to power the equipment (emission factors). The basic emission estimating equation is the following:

$$\mathbf{E = hrs \times LF \times EF}$$

Where:

**E** = Emissions per period of time such as a year or the entire project.
**hrs** = Number of operating hours in the period of time (e.g., hours per year, hours per project).
**LF** = Load factor, an estimate of the average percentage of full load an engine is run at in its usual operating mode.
**EF** = Emission factor, an estimate of the amount of a pollutant (such as $NO_x$) that an engine emits while performing a defined amount of work.

In these estimates, the emission factors are in units of grams of pollutant per horsepower hour (g/hphr). For each piece of equipment, the number of horsepower hours (hphr) is calculated by multiplying the engine's horsepower by the load factor assigned to the type of equipment and the number of hours that piece of equipment is anticipated to work during the year or during the project. For example, a crane with a 250-horsepower engine would have a load factor of 0.43 (meaning on average the crane's engine operates at 43% of its maximum rated power output). If the crane were anticipated to operate 1,000 hours during the course of the project, the horsepower hours would be calculated by:

$$\mathbf{250\ horsepower \times 0.43 \times 1{,}000\ hours = 107{,}500\ hphr}$$

The emissions from diesel engines vary with the age of an engine and, most importantly, with when it was built. Newer engines of a given size and function typically emit lower levels of pollutants than older engines. The $NO_x$ emission factors used in these calculations assume that the equipment pre-dates most emission control requirements (known as Tier 0 engines in most cases), to provide a reasonable "upper bound" to the emission estimates. If newer engines are actually used in the work, then emissions will be lower than estimated for the same amount of work. In the example of the crane engine, a $NO_x$ emission factor of 9.5 g/hphr would be used to estimate emissions from this crane on the project by the following equation:

$$\mathbf{\frac{107{,}500\ hphr \times 9.5\ g\ NO_x/hphr}{453.59\ g/lb \times 2{,}000\ lbs/ton} = 1.1\ tons\ of\ NO_x}$$

As noted above, information on the equipment types, horsepower, and hours of operation associated with the project have been obtained from the project's plans and represent current best estimates of the equipment and work that will be required. Load factors have been obtained from various sources depending on the type of equipment. Marine engine load factors are primarily from a document associated with the New York and New Jersey Harbor Deepening Project (HDP): "Marine and Land-Based Mobile Source Emission Estimates for the Consolidated Schedule of 50-Foot Deepening Project, January 2004," and from EPA's 1998 Regulatory Impact Analysis (RIA): "EPA Regulatory Impact Analysis: Control of Commercial Marine Vessels." Land-side nonroad equipment load factors are from the documentation for EPA's NONROAD emission estimating model, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA420-P-04-005, April 2004."

Emission factors have also been sourced from a variety of documents and other sources depending on engine type and pollutant. The $NO_x$ emission factors for marine engines have been developed primarily from EPA documentation for the Category 1 and 2 standards (RIA, "Control of Emission from Marine Engines, November 1999) and are consistent with emission factors used in documenting emissions from the HDP, while the VOC emission factors for marine engines are from the Port Authority of New York and New Jersey's "2010 Multi-Facility Emissions Inventory" which represent the range of marine engines operating in the New Jersey harbor and coastal region in terms of age and regulatory tier level. Nonroad equipment $NO_x$ emission factors have been derived from EPA emission standards and documentation, while the nonroad VOC emission factors have been based on EPA's Diesel Emissions Quantifier (DEQ, accessed at: *www.epa.gov/cleandiesel/quantifier/*), run for moderately old equipment (model year 1995). On-road vehicle emission factors have also been developed from the DEQ, assuming a mixture of Class 8, Class 6, and Class 5 (the smallest covered by the DEQ) on-road trucks.

As noted above, the emission factors have been chosen to be moderately conservative so as not to underestimate project emissions. Actual project emissions will be estimated and tracked during the course of the project and will be based on the characteristics and operating hours of the specific equipment chosen by the contractor to do the work.

The following pages summarize the estimated emissions of pollutants relevant to General Conformity, $NO_x$, VOC, $PM_{2.5}$, and $SO_2$ in sum for the project and by calendar year based on the schedule information also presented (in terms of operating months per year). Following this summary information are project details including the anticipated equipment and engine information developed by the New York District, the load factors and emission factors as discussed above, and the estimated emissions for the project by piece of equipment.

**USACE - New York District**
**NAN - Sandy-Related Projects**
**South Shore of Staten Island (SSSI) Feasibility Study**
**Equipment Emission Estimates**
**29 October 2014**
**DRAFT**

## Overall Summary

| | Total Tons for Project | | | | |
|---|---|---|---|---|---|
| **Equipment Type** | **$NO_x$** | **VOC** | **$SO_x$** | **$PM_{2.5}$** | **CO** |
| Off-road equipment | 53.8 | 1.08 | 0.03 | 0.91 | 6.9 |
| On-road vehicles | 76.8 | 3.69 | 0.06 | 3.80 | 21.8 |
| **Totals** | **130.7** | **4.77** | **0.08** | **4.70** | **28.7** |

## Schedule of Construction Activity

| | | Months of Construction Activity | | | | |
|---|---|---|---|---|---|---|
| **Work Area** | **Schedule** | **2016** | **2017** | **2018** | **2019** | **Total** |
| Oakwood to Miller Field | 29 June 2016 through 16 October 2018 | 6.0 | 12.0 | 9.5 | 0.0 | 27.5 |
| Miller Field to Fort Wadsworth | 14 December 2016 through 15 October 2019 | 0.5 | 12.0 | 12.0 | 9.5 | 34.0 |
| | | 6.5 | 24.0 | 21.5 | 9.5 | 61.5 |

## General Conformity-applicable emissions per calendar year

| | Year of Construction Activity | | | |
|---|---|---|---|---|
| **Emissions by Year** | **2016** | **2017** | **2018** | **2019** |
| **NOx** | 13.8 | 51.0 | 45.7 | 20.2 |
| **VOC** | 0.50 | 1.86 | 1.67 | 0.74 |
| **$SO_2$** | 0.01 | 0.03 | 0.03 | 0.01 |
| **$PM_{2.5}$** | 0.50 | 1.84 | 1.64 | 0.73 |

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| | | | Load | | | grams per hphr* | | | | | tons | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Description, off-road equipment*** | **Category** | **Horsepower (approx.)** | **Factor** | **Hours** | **hphrs** | **$NO_x$** | **VOC** | **$SO_x$** | **$PM_{2.5}$** | **CO** | **$NO_x$** | **VOC** | **$SO_x$** | **$PM_{2.5}$** | **CO** |
| Air compressor | Compressor | 100 | 0.43 | 400 | 17,200 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.180 | 0.004 | 0.0001 | 0.003 | 0.02 |
| Air compressor | Compressor | 100 | 0.43 | 745 | 32,035 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.335 | 0.007 | 0.0002 | 0.006 | 0.04 |
| Asphalt paver | Other diesel engines | 225 | 0.59 | 281 | 37,303 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.391 | 0.008 | 0.0002 | 0.007 | 0.05 |
| Compactor , vibroplate | Other diesel engines | 250 | 0.59 | 620 | 91,450 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.958 | 0.019 | 0.0005 | 0.016 | 0.12 |
| Compactor roller vibratory | Other diesel engines | 250 | 0.59 | 353 | 52,068 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.545 | 0.011 | 0.0003 | 0.009 | 0.07 |
| Crane , hydraulic, self-propelled, rough terrain | Crane | 225 | 0.43 | 137 | 13,255 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.139 | 0.003 | 0.0001 | 0.002 | 0.02 |
| Crane , hydraulic, self-propelled, yard | Crane | 225 | 0.43 | 492 | 47,601 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.498 | 0.010 | 0.0003 | 0.008 | 0.06 |
| Crane , hydraulic, truck mounted | Crane | 225 | 0.43 | 408 | 39,474 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.413 | 0.008 | 0.0002 | 0.007 | 0.05 |
| Crane , hydraulic, truck mounted | Crane | 225 | 0.43 | 560 | 54,180 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.567 | 0.011 | 0.0003 | 0.010 | 0.07 |
| Crane , hydraulic, truck mounted | Crane | 225 | 0.43 | 35 | 3,386 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.035 | 0.001 | 0.0000 | 0.001 | 0.00 |
| Crane , mechanical, lattice boom, crawler, dragline/clamshell | Crane | 225 | 0.43 | 2,245 | 217,204 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 2.275 | 0.045 | 0.0012 | 0.038 | 0.29 |
| Crane , mechanical, lattice boom, crawler, dragline/clamshell | Crane | 225 | 0.43 | 709 | 68,596 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.718 | 0.014 | 0.0004 | 0.012 | 0.09 |
| Crane , mechanical, lattice boom, crawler, lifting, | Crane | 225 | 0.43 | 745 | 72,079 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.755 | 0.015 | 0.0004 | 0.013 | 0.10 |
| Cranes , hydraulic, self-propelled, yard | Crane | 225 | 0.43 | 960 | 92,880 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.973 | 0.019 | 0.0005 | 0.016 | 0.12 |
| Generator set, skid mounted | Generator | 100 | 0.43 | 296 | 12,728 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.133 | 0.003 | 0.0001 | 0.002 | 0.02 |
| Grader , motor, articulated | Grader | 135 | 0.59 | 860 | 68,499 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.717 | 0.014 | 0.0004 | 0.012 | 0.09 |
| Hydraulic excavator, crawler | Excavator | 250 | 0.59 | 458 | 67,555 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.707 | 0.014 | 0.0004 | 0.012 | 0.09 |
| Hydraulic excavator, crawler | Excavator | 250 | 0.59 | 4,828 | 712,130 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 7.457 | 0.149 | 0.0039 | 0.126 | 0.95 |
| Hydraulic excavator, crawler | Excavator | 300 | 0.59 | 824 | 145,848 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 1.527 | 0.031 | 0.0008 | 0.026 | 0.19 |
| Hydraulic excavator, crawler | Excavator | 300 | 0.59 | 10,639 | 1,883,103 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 19.720 | 0.394 | 0.0104 | 0.332 | 2.51 |
| Loader , front end, crawler | Skid Steer Loader | 175 | 0.21 | 43 | 1,580 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.017 | 0.000 | 0.0000 | 0.000 | 0.00 |
| Loader , front end, crawler | Skid Steer Loader | 175 | 0.21 | 13 | 478 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.005 | 0.000 | 0.0000 | 0.000 | 0.00 |
| Loader , front end, wheel, articulated | Rubber tired loader | 110 | 0.59 | 210 | 13,629 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.143 | 0.003 | 0.0001 | 0.002 | 0.02 |
| Loader , front end, wheel, articulated | Rubber tired loader | 110 | 0.59 | 34 | 2,207 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.023 | 0.000 | 0.0000 | 0.000 | 0.00 |
| Loader , front end, wheel, articulated | Rubber tired loader | 175 | 0.59 | 93 | 9,602 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.101 | 0.002 | 0.0001 | 0.002 | 0.01 |
| Loader , front end, wheel, articulated | Rubber tired loader | 175 | 0.59 | 633 | 65,357 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.684 | 0.014 | 0.0004 | 0.012 | 0.09 |
| Loader/backhoe , wheel | Rubber tired loader | 110 | 0.59 | 2,989 | 193,986 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 2.031 | 0.041 | 0.0011 | 0.034 | 0.26 |
| Loader/backhoe , wheel | Rubber tired loader | 135 | 0.59 | 11 | 876 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.009 | 0.000 | 0.0000 | 0.000 | 0.00 |
| Pile hammer, double acting, diesel | Other diesel engines | 100 | 0.59 | 709 | 41,831 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.438 | 0.009 | 0.0002 | 0.007 | 0.06 |
| Pile hammer, driver/extractor, vibratory | Other diesel engines | 100 | 0.59 | 2,245 | 132,455 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 1.387 | 0.028 | 0.0007 | 0.023 | 0.18 |
| Pile hammer, single acting, pnuematic (steam/air) | Other diesel engines | 100 | 0.59 | 745 | 43,955 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.460 | 0.009 | 0.0002 | 0.008 | 0.06 |
| Roller , static, self-propelled, pneumatic | Other diesel engines | 150 | 0.59 | 281 | 24,869 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.260 | 0.005 | 0.0001 | 0.004 | 0.03 |
| Roller , static, self-propelled, pneumatic | Other diesel engines | 150 | 0.59 | 860 | 76,110 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.797 | 0.016 | 0.0004 | 0.013 | 0.10 |
| Roller , vibratory, self-propelled, double drum, padded drum | Other diesel engines | 100 | 0.59 | 984 | 58,056 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.608 | 0.012 | 0.0003 | 0.010 | 0.08 |
| Roller , vibratory, self-propelled, double drum, smooth | Other diesel engines | 100 | 0.59 | 1,681 | 99,179 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 1.039 | 0.021 | 0.0005 | 0.017 | 0.13 |
| Roller , vibratory, self-propelled, double drum, smooth | Other diesel engines | 100 | 0.59 | 80 | 4,720 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.049 | 0.001 | 0.0000 | 0.001 | 0.01 |
| Roller , vibratory, towed, single drum, sheepsfoot | Other diesel engines | 250 | 0.59 | 706 | 104,135 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 1.091 | 0.022 | 0.0006 | 0.018 | 0.14 |
| Scraper , tandem powered, standard loading | Other diesel engines | 100 | 0.59 | 393 | 23,187 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.243 | 0.005 | 0.0001 | 0.004 | 0.03 |
| Tractor , agricultural, wheel | Other diesel engines | 56 | 0.59 | 360 | 11,894 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.125 | 0.002 | 0.0001 | 0.002 | 0.02 |
| Tractor , crawler (dozer) | Crawler tractor | 75 | 0.59 | 208 | 9,204 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.096 | 0.002 | 0.0001 | 0.002 | 0.01 |
| Tractor , crawler (dozer) | Crawler tractor | 100 | 0.59 | 372 | 21,948 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.230 | 0.005 | 0.0001 | 0.004 | 0.03 |
| Tractor , crawler (dozer) | Crawler tractor | 135 | 0.59 | 8 | 637 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.007 | 0.000 | 0.0000 | 0.000 | 0.00 |
| Tractor , crawler (dozer) | Crawler tractor | 250 | 0.59 | 961 | 141,748 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 1.484 | 0.030 | 0.0008 | 0.025 | 0.19 |
| Tractor , crawler (dozer) | Crawler tractor | 300 | 0.59 | 178 | 31,506 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.330 | 0.007 | 0.0002 | 0.006 | 0.04 |
| Tractor , crawler (dozer) | Crawler tractor | 440 | 0.59 | 596 | 154,722 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 1.620 | 0.032 | 0.0009 | 0.027 | 0.21 |
| Trencher , chain type cutter | Other diesel engines | 50 | 0.59 | 497 | 14,662 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.154 | 0.003 | 0.0001 | 0.003 | 0.02 |
| Truck , water, off-highway | Other diesel engines | 250 | 0.59 | 860 | 126,850 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 1.328 | 0.027 | 0.0007 | 0.022 | 0.17 |
| Welder , engine driven, diesel | Other diesel engines | 35 | 0.59 | 193 | 3,985 | 9.5 | 0.19 | 0.0050 | 0.16 | 1.21 | 0.042 | 0.001 | 0.0000 | 0.001 | 0.01 |
| **Totals** | | | | | **5,141,940** | | | | | | **53.85** | **1.08** | **0.03** | **0.91** | **6.86** |

* Emission factors consistent with NAN ABU emission estimates and documented with that work.

| | | | | grams per mile** | | | | | tons | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Description, on-road vehicles*** | **Category** | **Hours** | **Miles** | **$NO_x$** | **VOC** | **$SO_x$** | **$PM_{2.5}$** | **CO** | **$NO_x$** | **VOC** | **$SO_x$** | **$PM_{2.5}$** | **CO** |
| Dump truck, highway, 35,000 lbs | Class 6 diesel truck | 747 | 26,145 | 20.6 | 1.2 | 0.017 | 1.1 | 6.3 | 0.594 | 0.033 | 0.0005 | 0.031 | 0.18 |
| Dump truck, highway, 75,000 lbs | Class 8 diesel truck | 13,202 | 462,070 | 29.7 | 1.0 | 0.017 | 1.3 | 7.3 | 15.125 | 0.516 | 0.0087 | 0.685 | 3.72 |
| Truck , highway, 25,000 lbs | Class 6 diesel truck | 510 | 17,850 | 20.6 | 1.2 | 0.017 | 1.1 | 6.3 | 0.405 | 0.023 | 0.0003 | 0.021 | 0.12 |
| Truck , highway, 45,000 lbs | Class 6 diesel truck | 46,407 | 1,624,245 | 20.6 | 1.2 | 0.017 | 1.1 | 6.3 | 36.896 | 2.064 | 0.0304 | 1.909 | 11.28 |
| Truck , highway, 45,000 lbs | Class 6 diesel truck | 1,393 | 48,755 | 20.6 | 1.2 | 0.017 | 1.1 | 6.3 | 1.108 | 0.062 | 0.0009 | 0.057 | 0.34 |
| Truck , highway, 50,000 lbs | Class 8 diesel truck | 11,024 | 385,840 | 29.7 | 1.0 | 0.017 | 1.3 | 7.3 | 12.629 | 0.431 | 0.0072 | 0.572 | 3.10 |
| Truck , highway, conventional, 8,800 lbs | Class 6 diesel truck | 12,685 | 443,975 | 20.6 | 1.2 | 0.017 | 1.1 | 6.3 | 10.085 | 0.564 | 0.0083 | 0.522 | 3.08 |
| **Totals** | | **85,968** | **3,008,880** | | | | | | **76.84** | **3.69** | **0.06** | **3.80** | **21.83** |

On-road truck activity assume travel at 35 mph average, conservative 1995 MY trucks

* Per NYDEC finding, land-side emissions are accounted for in the applicable SIP and are therefore not considered in the General Conformity evaluation.

** Emission factors estimated from EPA's Diesel Emission Quantifier. While not valid for SIP work, provides close approximation for these project-level estimates.
Based on 1995 model year vehicles in CY 2015 to provide conservatively high emission estimates.
The exception is SOx EFs which are taken from the PANYNJ 2012 emissions inventory report for heavy-duty diesel vehicles

| Land-side Equipment Types | Load Factor |
|---|---|
| Backhoe | 21% |
| Booster pump | 43% |
| Compactor | 43% |
| Compressor | 43% |
| Concrete saw | 59% |
| Conveyor | 43% |
| Crane | 43% |
| Crawler tractor | 59% |
| Dozer | 59% |
| Drilling rig | 43% |
| Excavator | 59% |
| Forklift | 59% |
| Generator | 43% |
| Grader | 59% |
| Light plants | 43% |
| Off-road truck | 59% |
| Other diesel engines | 59% |
| Pump | 43% |
| Rubber tired loader | 59% |
| Screen | 43% |
| Skid Steer Loader | 21% |
| Winch | 43% |